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## Original Article

## Food taboos and suggestions among Madurese pregnant women: a qualitative study

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## ABSTRACT

**Background:** Cultural factors influence food consumption, particularly among pregnant women. Beliefs in certain food-associated myths and taboos still exist in Madura Island. Therefore, this study aims to explore the food taboos and food suggestions among Madurese pregnant women.

**Methods:** This qualitative study was carried out in Sumenep Regency, Madura Island, Indonesia. Data were collected from pregnant women, traditional birth attendants, and community leaders through in-depth interviews and focus group discussion.

**Results:** Foods that were mostly considered taboos for pregnant women were squid, shrimp, pineapple, kedondong, cabbage, cold water, and instant noodles. Food suggestions for pregnant women were rice, corn rice, skipjack tuna, tilapia fish, milkfish, egg, moringa leaves, apples, and coconut water.

**Conclusion:** Many food taboos and food suggestions were applied for the pregnant women in Madura. Indigenous knowledge about the food suggestions can be good information in supporting nutrition education for the Madurese pregnant women.

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## 1. Introduction

Pregnancy is a very important period for the life of the mother and baby. The low nutritional status of the mother during pregnancy may increase the risk of premature birth, low birth weight, and less optimal growth and development of children [1,2]. During pregnancy, the nutritional requirements of pregnant women are increased; especially, they require additional energy, proteins, vitamin A, folate, calcium, iron, and iodine [3]. These nutrients are found mainly in animal foods, nuts, and vegetables.

Cultural factors such as beliefs, values, norms, knowledge, food taboos, food suggestions, customs, and practices related to food consumption of pregnant women as well as the socioeconomic condition affect the nutritional status of mothers [4]. The nature

of the food taboos is divided into permanent and temporary. Food taboo that is permanent is due to the ban in religion, whereas the food taboo that is temporary is due to certain conditions in the cycle of life [5].

Otoo et al stated that during pregnancy, women in Western Region of Ghana were forbidden from consuming nutritious food items such as sweet potato, wheat, sorghum, and mango; it is feared that these foods lead to complications, such as high birth weight, difficult birth, and difficulty doing a job. However, pregnant women are suggested to consume meat, nuts, fruits, and vegetables to maintain health during pregnancy and to maintain blood reserves during childbirth. Maintaining health during pregnancy will help in giving birth to a healthy baby. Moreover, pregnant women are also given some herbal drugs to induce, enhance, and control bleeding during labor [6].

Pregnant women of the ethnic people in Makassar, Indonesia, are not allowed to consume papaya because of the belief that papaya can cause stomachache before giving birth, although consuming papaya can help defecation [7]. There is a belief that prohibition and taboo exist to protect the health of mothers and their babies, but the food taboos may also increase the risk of

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deficiency of proteins, fats, vitamin A, calcium, and iron in pregnant women [8]. Beliefs in certain food-associated myths and taboos still exist in East Java, particularly in Madura Island. Thus, the aim of this research was to explore the food taboos and suggestions among Madurese pregnant women.

## 2. Methods

### 2.1. Setting

This study was conducted in Sumenep, Madura Island, Indonesia, from January 2017 until March 2018. Sumenep Regency is one of four districts that are located exactly on the eastern part of Madura Island, East Java Province, Indonesia (Fig. 1). Sumenep Regency is a tropical region which consists of mainland and archipelagic area. The inhabitants of Sumenep Regency are mostly indigenous Madurese and are mainly found in the mainland.

### 2.2. Key informants

The qualitative data were collected from pregnant women, traditional birth attendants (TBAs), and community leaders using in-depth interviews and focus group discussion (FGD). Overall, the number of informants in this qualitative research was 67. This research consisted of 40 people for in-depth interviews (15 pregnant women, 15 pregnant women's family members such as the mother or mother-in-law, and 10 TBAs) and 27 people for FGD (10 pregnant women's family, 11 community figures, and 6 TBAs).

### 2.3. Data management and analysis

The qualitative data were collected in the form of images and recordings. Interviews and FGD were conducted in Madurese language and Indonesian language and then transcribed into English. The researcher checked the recording and compared it with the transcript. The researcher also discussed with the enumerator regarding the non-English transcript to ensure the meaning and comments were accurate. Transcription of recordings was made and then identified and analyzed for the meaning, value, belief, experience, and practice. Content and source analysis was done to analyze the data.

## 2.4. Ethical considerations

Ethical approval was obtained from the Health Research Ethics Committee, Faculty of Public Health, Universitas Airlangga No 1-KEPK. Informed consent was given by all participants.

## 3. Results

### 3.1. Food taboos

#### 3.1.1. Animal foods

Based on the in-depth interviews and FGD, food taboos that are widely practiced by pregnant women in Madura can be classified into four groups: animal food, vegetables, fruits, and drinks (Fig. 2). Foods that were mostly considered a taboo for the pregnant women were squid, shrimp, pineapple, cabbage, and cold water/ice. Most of the informants said that many food taboos exist for the pregnant women, particularly seafood. One pregnant mother said,

*“Aaaa ... fishy like seafood it is not allowed ... therefore I am not eating it anymore...my husband not allowed me to eat fish, afraid if the baby's navel wound won't dry...” (YYN).*

Seafood types such as squid, shrimp, stingray, and octopus were considered taboo for all pregnant women in all gestational ages. These seafood types were believed to be harmful for pregnancy and delivery. Most people believed and followed the food taboos for many generations. However, they did not know the reason for doing it or the philosophy behind it. Some TBAs said,

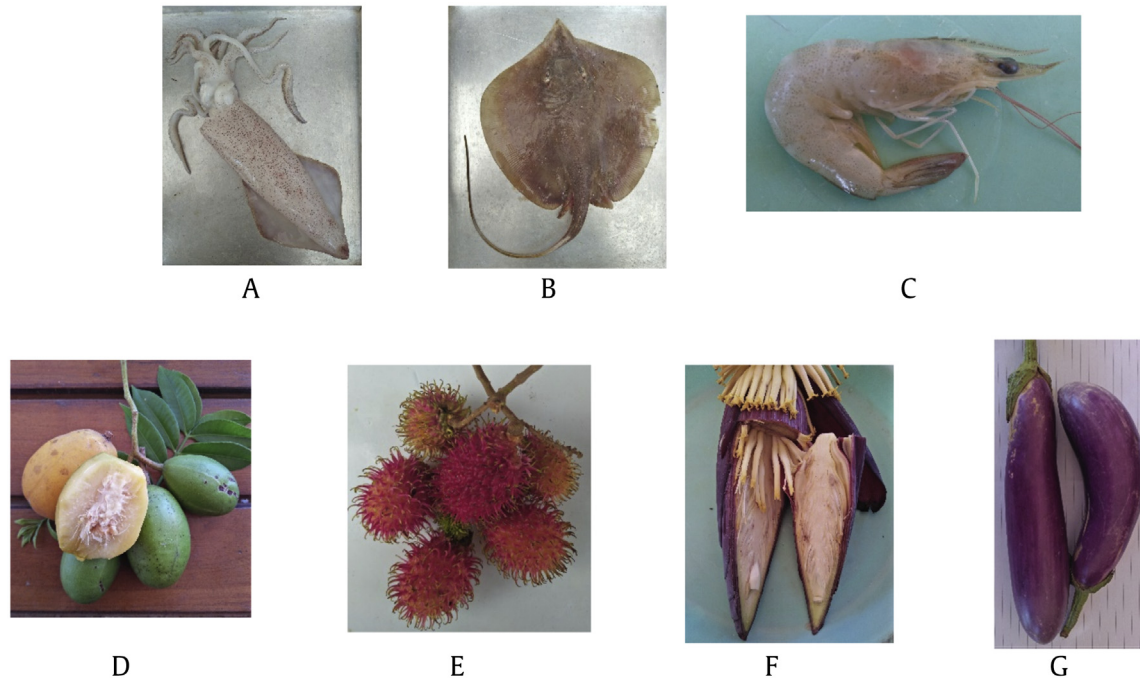
*“The elders said that shrimp and squid are not allowed consumed [by pregnant women]” (JU, 50 years old).*

*“It is believed by the people in the past ... It happened to my mother's patient... It is said that pregnant women are not allowed to consume blenadhen (fish), shrimp, and squid, it is not allowed” (SU, 49 years old).*

Based on the in-depth interviews, we understand that the philosophy of the taboo against shrimp was seen from the nature of this animal which is always curved; therefore, there was fear that consuming shrimp can make the fetus curve and that the baby curls up after birth. It is considered that babies born to mothers who consumed shrimps during pregnancy can easily get seizures when they get a fever.



Fig. 1. Sumenep regency is located in the eastern Madura Island, East Java Province, Indonesia.



**Fig. 2.** Food taboos for pregnant women. (A) Squid. (B) Stingray. (C) Shrimp. (D) Kedondong. (E) Rambutan. (F) Banana inflorescence. (G) Eggplant.

*"Shrimp .... hahahahahaha shrimp. There is fear that the child will curl up and jump up and down [if pregnant women consume shrimp] hahahahahaha. Fear of seizure"* (KH, 28 years old).

In addition, shrimp is an animal that lives at the bottom of the sea and likes to hide in the sand. Based on this theory, people consider that the fetus of the pregnant women who consumed shrimp likes to hide; therefore, the baby will not come out during delivery, making this process difficult. Some pregnant women said,

*"It's not allowed to consume the shrimp if you're pregnant. Shrimp likes to hide, so it is said that the baby might be difficult to come out at birth"* (DW, 31 years old).

*"It is said that fish is like shrimp. It likes to go in and out. It is believed that it can make the baby difficult to come out at birth"* (NU, 25 years old).

Other beliefs related to the impact of shrimp were that this food can make the baby weak during labor, the baby will go in and out in the birth canal, or the baby will not come out during the delivery process or when mothers push. It is considered that this food makes the baby keep moving in the womb.

*"Similar to shrimp, shrimp and squid, fear of the baby weak ..."* (IN, 20 years old).

*"It's similar to shrimp. [Pregnant women consuming shrimp] can cause the baby keeps moving and not directly go down [to the birth canal]"* (KU, 26 years old).

Squid is one of the animals that walk backward while it moves. This is considered to have an adverse effect on pregnant women. Although there was information from the health personnel about this food taboo, the pregnant women and the

TBAs still believe the taboo and the pregnant women avoid consuming it.

*"Madurese said that squid walks backward, so there is fear of the baby not coming out, it backwards like squid. It is based on the custom here. I don't know in the medical issue. But it is said it won't happen"* (RA, 29 years old)

*"It is said that squid will make the delivery process difficult. It is like squid that walks backwards"* (YU, 39 years old).

Pregnant women who consume squid during early pregnancy (in the first trimester) are believed to experience miscarriage. One TBA said,

*"Squid..., is not allowed, It can cause miscarriage"* (MA, 60 years old).

Mothers who consume squid during pregnancy until delivery were considered to complicate the pregnancy because it is considered that the baby would stay inside or face difficulty in coming out during birth. The squid is considered to make the baby weak and result in wrapping of the umbilical cord around the baby's neck.

*"If she eat squid, afraid the newborn become weak"* (IS, 37 years old)

The TBAs always urge their patients to avoid this food, but some mothers still consume squid secretly. Therefore, when there is a difficult labor case, the TBA assumes that the difficulty is due to the breaking of the food taboo by the mother.

*"Squid if ... it is tradition... yeah ... it depends on each individual, sometimes there is people whose ... it's a myth, there are some eat it... but people who obeyed not to consume squid"* (TO, 65 years old).

*"Sometimes, squid can cause the baby...he he... the baby's weak"* (TO, 65 years old).

Taboo of stingray has a similar philosophy to that of shrimp. Stingray is considered as a fish that likes to hide, so people assume that consumption of stingrays by pregnant women can make the baby hide during the labor process, which means that the baby does not want to come out during delivery.

*"It is similar, Sir. Here, squid and stingray are not allowed to consume. Food from sea shells are not allowed to consume" (MSD).*

The octopus has tentacles that are considered sticky; therefore, for the pregnant women who consume octopus, there is fear that the placenta will stick to the womb.

*"It's octopus. It is said that a part on octopus is sticky. Fear that the placenta stuck inside, and couldn't come out" (SH, 45 years old).*

Consumption of high-fat foods from animals, such as meatballs and offal, was also not allowed. High-fat foods from animals were believed to make the newborn fatter.

*"As far as I know... here, meatball is also not allowed to consume. It contains fat... I have a pregnant sister. When she was pregnant, she kept eating meatball and when her baby was born, the baby was full of fat" (YU, 39 years old).*

### 3.1.2. Vegetables

There are some vegetables that are believed to have unfavorable effects or might even harm the mother if taken during pregnancy. Therefore, prohibition of certain vegetables is applied for pregnant women. Madurese, specifically Sumenep people, believed that water spinach, eggplant, cabbage, banana inflorescence, and chili were not good when consumed by pregnant women.

Raw eggplant has a hard surface and skin that blends with the meat; therefore, it cannot be peeled manually. This raises the perception that the eggplant has smooth but thick or hard skin. Based on this philosophy, Sumenep people believed that if pregnant women ate the eggplant, then the fetus would be wrapped in a thick membrane like the eggplant. This can certainly lengthen the duration of the labor process and lead to difficult delivery. In addition, eggplant was also considered to affect the fetus by making it become small and blue.

*"Yes, I have experienced it. I ate cassava and eggplant and then I got scolded by my parents. They asked why I ate cassava and if I wanted my child have stomach ache!" (JU, 50 years old).*

*"Eating eggplant will also cause the baby wrapped around. The placenta will be thick as eggplant. It is said that the mother should bite the eggplant when giving birth" (HI, 34 years old).*

*"It is said that the placenta doesn't come out, they said it was closed by eggplant" (NU, 25 years old).*

Consumption of water spinach by pregnant women is considered to cause birth of conjoined twins or bleeding when the mother is in labor and difficulty during birth and lead to birth of a big baby.

*"Yes, water spinach and eggplant are not allowed to be consumed by pregnant women because it can cause the delivery process difficult" (JU, 50 years old).*

The banana inflorescence was believed to make the fetus small or shrink it. One pregnant mother said,

*"I have ... I have eaten, what is it called? The inflorescence .... The banana inflorescence. There is a fear that the child later will .... the banana hump...hahahaha..." (HI, 34 years old).*

Chili was also considered a taboo food for pregnant women because it is considered to make infants dirty, sick, and cry easily. Some TBAs said,

*"Chili...afraid the baby will get sick easily, afraid the baby easy to cry" (HL)*

*"If the mother eat chili, the baby skin can be peeled" (ST, 70 years old)*

### 3.1.3. Fruits

Pregnant women were not allowed to consume several kinds of fruits because there was a fear of miscarriage. Consumption of fruits such as kedondong, pineapple, snake fruit, watermelon, durian, and rambutan by pregnant women was not allowed. The reason given was related to the fear of miscarriage and the heat generated in stomach by consuming those fruits. Kedondong and pineapple were mostly avoided by pregnant women. Kedondong is mostly avoided in the third trimester, whereas the pineapple is avoided in the first and second trimester.

*"Kedondong. It is said that there will be bleeding during childbirth [if pregnant women consume kedondong]" (IN, 20 years old).*

*"I heard that kedondong can cause bleeding, so I just followed it" (JU, 50 years old).*

Pineapple was considered a taboo for consumption in the first trimester until the early second trimester for pregnant women because it can cause miscarriage. Some people think that consuming pineapple at the end of pregnancy can also harm the mother and baby. This is based on the philosophy that the pineapple generates heat, so it can cause a miscarriage or bring on labor.

*"Pineapples are not allowed to be consumed" (MA, 60 years old).*

*"Something hot such as pineapple, alcohol, are not allowed to be eaten" (TO, 65 years old).*

*"Kedondong, they said they fear of, can cause conjoined twins. There will be bleeding at childbirth. While it is also said that pineapple can cause a miscarriage in the first trimester" (NU, 25 years old).*

*"Well ... it's like ... pineapple, when pregnant women is still in the first trimester, they are not allowed to consume" (KH, 62 years old).*

Rambutan and snake fruit were believed to restrict the birth canal, complicate the labor, and cause bleeding during childbirth.

*"Hmm ... it can cause a miscarriage ... rambutan and snake fruit are also not allowed. Snake fruit can cause ... rambutan. It can difficulty when the baby wants to go out/ delivery process, the baby path becomes shrunken, the uterus" (CA, 72 years old).*

### 3.1.4. Drinks

Madura is a coastal region with high temperatures. Consuming ice or cold drinks is considered to help people to reduce the heat due to the air temperature in the region. However, in Sumenep, people have a special belief related to consumption of ice or cold drinks by pregnant women. Most Sumenep people believed that iced drinks were dangerous for pregnant women; therefore, it was

taboo for mothers to consume ice or cold water during pregnancy. This is considered to create complications in mothers while giving birth. Mothers who continue to consume ice or cold water were believed to have very fertile womb that has a negative impact on the mother and the baby, for instance, the baby will be big, thereby complicating the birth process. In addition, the mother would give birth to conjoined twins or experience bleeding during the delivery process.

*"I don't really know ... sometimes, it is forbidden here, she asked to not drinking ice, meatballs ... if its me" (AW, 53 years old)*

*"Ice is the same like kedondong, it is said that there will be bleeding in the delivery process" (IN, 20 years old).*

*"As well as the ice, it is said that the baby will be born big...they said" (BU, 42 years old).*

*"If the pregnancy is above six or four months, pregnant women are not allowed to consume a lot of ice because the womb might be too fertile. But we let them do what they want to do if they are stubborn. Sometimes, some pregnant women have a habit of drinking cold water and doesn't want to drink the regular water" (HL).*

### 3.1.5. Other foods

Pregnant women, particularly in the third trimester, avoided fried noodles. Fried noodle (instant noodle) was avoided because the seasoning was considered not good for the baby. Traditionally, people believed that pregnant women should not consume noodles, but they did not know the reasons for prohibition. However, some people still avoid noodle consumption during pregnancy.

*"Noodles, afraid of ... I don't know, my parents said so...I just followed them" (IN, 20 years old).*

*"Yes ... from other people...the story like that Sir ... don't eat kedondong, noodles too much" (IMN).*

## 3.2. Food suggestions

Food sources of carbohydrates, proteins, vitamins, and minerals are widely suggested by the Madurese, especially for pregnant women. Not only food taboos are applied for the pregnant women but also food suggestions are given. Many foods are recommended for pregnant women to improve the health of the mother and babies (Fig. 3).

### 3.2.1. Cerealia

In the study area, the pregnant women tend to consume foods that do not cause nausea (every pregnant woman can be different). Some pregnant women were likely to choose corn rice (*nasi jagung*), white rice, or even a combination of both as a daily source of carbohydrates.

*"Corn rice ... Corn rice ... very often" (IN, 20 years old).*

*"Rice, vegetables, side dishes, vegetables, white rice" (HI, 34 years old).*

### 3.2.2. Animal foods

The pregnant women tend to choose fish for daily consumption as a source of protein because of the affordable price and high availability. Here are animal foods that are suggested for pregnant women: meat, skipjack tuna or *Euthymus affinis*, *pindang* (sea fish that are processed by steaming), egg, *tempeh*, tofu, beef, *Mujair* fish (tilapia fish), and milkfish.

*"Yes fish" (HI, 34 years old).*

*"I eat rice ... with fish. The mackerel tuna...skipjack tuna..." (SU, 31 years old).*

*"I already told them fish has vitamin, that's me. However, I don't know, but I am also careful for myself. I don't know they will follow it or not. That's me, that's why when I saw the patient, they were only given kerupuk (fried crackers), and that doesn't have any vitamin" (SMN).*

*"When my gestational age was 8 months, Midwife Kiki told me to get ultrasonography check, it was strange in that gestational age the baby's weight was estimated less than a kilo, she said that the weight was only 8 ounces point something." Doctor Wongso told me to eat more meat. It's okay for me. "Keep consuming it, not only once, it should be consumed continuously" he said. But how can the people living here be able to buy it?" (HLM).*

*"Yeah we only eat the ordinary sea fish or usually we eat Mujair fish and milkfish" (MS).*

### 3.2.3. Vegetables

Vegetables that were suggested for the women during pregnancy in this region were moringa leaves, bean sprouts, spinach, and carrots. Most of the pregnant women consumed moringa leaves as a daily vegetable. The selection of moringa leaves was based on the belief that moringa leaves can eliminate toxins in the body of pregnant women; therefore, by eating moringa leaves, the women and their babies would be free from toxins, and the women can deliver their babies safely, and the newborn will be healthy.

*"If it is vegetable, it is moringa and spinach; soup cannot be consumed, I mean it cannot be consumed with cabbage in it, so just the carrot and potato" (MA, 42 years old).*

*"Yes water spinach, Chinese cabbage, if there is only cassava leaves, we consume the cassava leaves. That's all" (SMN).*

*"Corn rice ... corn rice ... sprouts ... That's all ... urap ... (it is a salad dish of steamed vegetables mixed with seasoned and spiced grated coconut for dressing" (IN, 20 years old)*

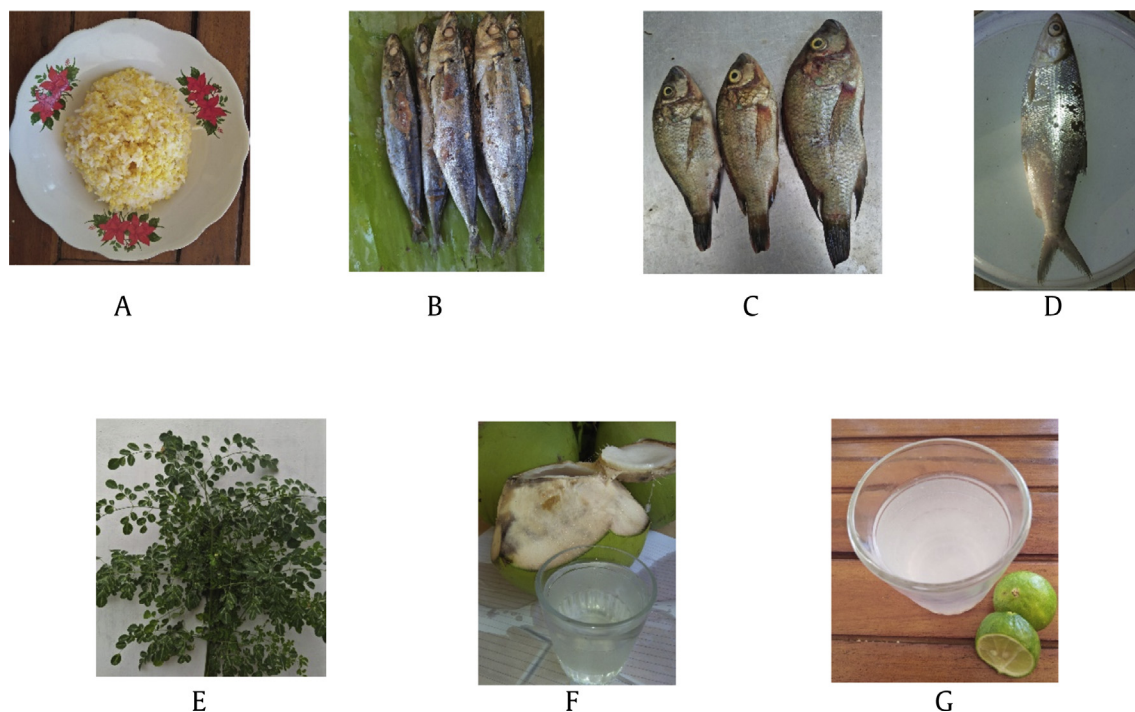
### 3.2.4. Fruits

Food sources of vitamins and minerals suggested for pregnant women were vegetables and fruits. However, daily fruit consumption was based on the financial condition, so pregnant women did not always consume fruits every day. Pregnant women consume lots of fruits because the fruits do not cause nausea (especially in the first trimester) in contrast to other food ingredients such as carbohydrates or sources of protein that can cause nausea. Fruits were also believed to be good for pregnancy, especially for the third trimester, and were suggested by TBAs.

*"Yes, if you have money, fruits are mandatory, if you have any" (PI, 20 years old).*

*"Like apples, the fruit from here is mango, but it is only available in the mango season. In the city, every time people have finished eating, the fruit is ready, but here, it is not ready. We have to buy first" (HLM).*

*"Yes. Rice, skipjack fish with moringa leaves, but because it is smelly, I don't want to eat anything. I want to throw up to the smell of rice. I just want to eat young guava that usually makes me drool" (JU, 50 years old).*



**Fig. 3.** Food suggestions for pregnant women. (A) Corn rice (*nasi jagung*). (B) *Pindang* fish. (C) *Mujair* fish (tilapia fish). (D) Milkfish. (E) Moringa leaves. (F) Coconut water. (G) Lime water.

*"I said ... if your womb has been more than eight months, you have to eat a lot of fruits, not rice. Rice can make the baby big" (DJ, 66 years old).*

#### 3.2.5. Drinks

Pregnant women were suggested to consume coconut water and lime water. Consumption of coconut water was considered to make the baby's skin clean.

*"Coconut water," she said, it remove the dirty" (IN, 20 years old)*

*"I like that one that is sweet, the salty ... thats ... the salty one not sweet. The water of the lime .... with vinegar and sugar. It's limpid... delicious" (NU, 25 years old).*

## 4. Discussion

Pregnancy is considered sacred by society because a child is a very valuable sustenance for a family. From the results, it can be seen that there were taboo foods that all pregnant women are forbidden to eat during pregnancy. In this study, there were two main reasons for food taboos for the pregnant women: health and sociocultural reasons. Taboo foods were generally avoided for health reasons. Pregnant women avoid some foods because they believe if that food is eaten, it would cause problems for the mother and the babies during pregnancy or labor. Meanwhile, taboo foods that were avoided for sociocultural reasons are mainly based on the nature of the food. Most of the food taboos had no scientific explanation, but the pregnant women still obeyed it and did not consume them.

Various kinds of cultures associated with pregnant women, including myths, restrictions, and suggestions on certain foods, as well as ceremonies held in a particular month during pregnancy, have developed in the community. The culture is generally based

on experiences and beliefs with the aim of maintaining maternal and fetal safety [9,10].

The "hot" and "cold" foods were avoided and suggested, respectively, especially in particular gestational ages. "Hot" foods such as pineapple, snake fruit, and *durian* were avoided during the first trimester because they can cause heat in the womb and cause miscarriage. Meanwhile, "cold" foods such as fruits and vegetables were suggested in the third trimester because it is good for pregnancy, and it can make the baby's skin clean.

In this study, squid and shrimp were considered taboo for pregnant women. These seafood items have high protein content, but they also contain high cholesterol [11]. These prohibited seafood dishes could be substituted with other allowed seafood items. Madurese recommended other kinds of food sources of protein that can be consumed by pregnant women with affordable price and high availability such as skipjack tuna or mackerel tuna, *Mujair* fish, and milkfish. These fish also have high protein content and have a lower cholesterol level compared to squid and shrimp [11].

Seafood is a strong allergen that can trigger adverse reactions mediated by immunoglobulin E antibodies in sensitive individuals [12]. Therefore, pregnant women should know whether they have allergy to seafood so that they can substitute it with other animal sources of protein such as freshwater fish, meat, or eggs.

This study found that not many fruits and vegetables were considered taboo for pregnant women. Fruits and vegetables that are prohibited for the pregnant women were similar to those in the other regions in Indonesia [13,14].

In general, the pregnant women were not allowed to eat eggplant because it can complicate the delivery process, causing wrinkles and weakness in babies. This study is in line with the results of the research conducted by Darmina et al [15] in Southeast Sulawesi which states that consumption of eggplant was a taboo for pregnant women, although for different reasons: it would result in children being born black in color because the eggplant turns black

when cooked. Eggplant contains vitamin A, folate, and iron needed during pregnancy. In addition, the fiber content can reduce digestive problems, such as constipation.

Moringa leaves, spinach, and traditional mixed dishes in Madura can be alternative food for the pregnant women not consuming the food that are considered a taboo. Madurese suggested moringa leaves that are highly available in Madura Island, and it is a nutritious food. Moringa leaves contain higher iron and calcium than spinach [16]. Many traditional mixed dishes in Madura contain more than 3 or 4 kinds of fruits or vegetables, so it good to fulfill the nutrition requirement.

Pregnant women avoid the consumption of pineapple because of the fear of miscarriage. This is in line with a study by Harsoliya et al [17] which stated that the bromelain enzyme in pineapple can increase the risk of induced abortion. Pineapple also contains enough high sugar, so there is a fear that consuming pineapple would increase gestational diabetes risk.

*Kedondong* and pineapple were mostly avoided by pregnant women, but actually, the fruits can be consumed if they are ripe and in sufficient quantity. The unripe fruit has more acidic taste, and it can affect the digestive system. Pineapple is a source of vitamins A, B, and C and minerals such as calcium, phosphorus, and iron. In addition, pineapple also contains tannins, cardenolides, dienedolides, cardiac glycoside, and flavonoids. Bromelain enzymes in pineapple can be used to soften meat by releasing the protein bonds. Therefore, people did not allow pregnant women to consume pineapple because it was considered that pineapple can also soften fetus in the womb, thereby causing miscarriage. The research by Yakubu et al that has been carried out by giving pineapple juice to pregnant mice did not show fetal death and vaginal bleeding. In addition, pineapples with a dose of 250 and 500 mg/kg body weight may increase serum concentrations of progesterone and estrogen in pregnant rats [18].

Some fruits listed in this article that should not be consumed by pregnant women are the same as in the research conducted in Tengger Tribe. The smell from the fruit of mango, jackfruit, and *durian* is considered to be harmful for pregnancy [13].

Almost all fruits were suggested for pregnant women as long as they can afford to buy it. Fruits were believed to have a good effect on pregnancy. Vitamins C and B are nutrients that are mostly present in vegetables and fruits. Green vegetables and fruits contain lots of folic acid needed during pregnancy. Colored fruits are a good source of vitamins for the body, and fruits that contain fiber can help the defecating process, thereby reducing the risk of constipation [19].

Coconut water was highly recommended by Madurese for the pregnant women for the babies to have a clean skin. This finding was also in line with the study by Widyasari et al [20] in Sampang, which also recommended coconut water for pregnant women, although for a different reason (it is believed to lubricate the birth canal). Coconut water is suggested for consumption by pregnant women to increase their fluid intake and prevent dehydration because it contains lot of electrolytes [21].

Some of the reasons given by the respondents regarding food taboos are supported and can be proven scientifically, but there were also reasons based only on personal or others' experiences or knowledge passed from generation to generation. The impact of food prohibition on the health of pregnant women is detrimental, but some are dependent on the sensitivity of each individual.

## 5. Conclusion

Many food taboos exist for the pregnant women. There were health and sociocultural reasons for the food taboos. Most of the pregnant women obeyed and avoided the foods that were a taboo

whether they know the reason or not because they feared it can affect their health and babies' health.

Indigenous knowledge about the food suggestions can be good information in supporting nutrition education for the pregnant women in Madura Island. Many of the pregnant women avoid the foods that are considered a taboo; therefore, it is important for the health personnel to encourage the suggested foods that are affordable, highly available, and have a similar nutrient content or more nutritious than the taboo foods.

## Conflict of interest

There is no conflict of interest. The Neys-van Hoogstraten Foundation was not involved in study design, data collection, analysis, and data interpretation.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jef.2018.10.006>.

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